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When are caregivers more likely to offer sugary drinks and snacks to infants?

A qualitative thematic synthesis

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Abstract

Background: Many children consume more sugar than is recommended and caregivers often find it difficult to change this habit once established. This thematic synthesis aims to identify the 'critical situations' where caregivers may be more likely to offer infants sugary drinks and snacks.

Methods: This thematic synthesis is reported in accordance with the ENTREQ statement. Our confidence in the findings of our synthesis was assessed using the CERQual approach.

Findings: We included 16 studies, from the U.S, U.K, Australia and Denmark. We identified 8 'critical situations' when caregivers may be more likely to offer sugary drinks and snacks to infants.

Conclusions: Interventions that seek to reduce sugar intake for caries prevention in infants and young children may be more successful if they provide caregivers with practical parenting strategies to replace the non-nutritive functions of sugary foods and drinks, as opposed to taking an information-giving approach.

Introduction

Over the last decade, global sugar consumption has grown from about 130 to 178 million tonnes (World Cancer Research Fund International, 2015). There is evidence of a log- linear relationship between free-sugar consumption and dental caries and recent data suggest that fluoride use in childhood may delay rather than eliminate the onset of caries when free-sugar consumption is greater than 3% of energy intake (Sheiham & James, 2014). In light of the evidence linking free-sugars consumption to both tooth decay and obesity (Morenga, Mallard, & Mann, 2013; Moynihan & Kelly, 2014), the World Health Organisation and the UK Scientific Advisory Commission for Nutrition (SACN) have recently recommend that they contribute no more than 5% of total energy intake (Scientific Advisory Committee on Nutrition, 2015; World Health Organisation, 2015). This proportion of free-sugars intake is equivalent to about 6 teaspoons for an adult, or 5 teaspoons for a 4-6 year-old child.

Many caregivers report that although they intend to limit intake of sugary drinks and snacks in their children, they struggle to do so, and this continues to be the case even after their child has experienced the pain and infection caused by extensive dental caries (Freeman, Ekins, & Oliver, 2005; Herman, Malhotra, Wright, Fisher, & Whitaker, 2012; Peerbhay, 2009). Research shows that food and drinks preferences are modified by repeat exposure during the early years and the flavours that an infant is exposed to have been shown to affect their food preferences in later life (Birch & Marlin, 1982; Birch, 1998; Mennella & Trabulsi, 2012; Ventura & Mennella, 2011). Thus, for caries prevention in families identified as being at increased risk, it may be more effective to aim for the avoidance of creating a 'sugar habit' in infancy, rather than trying to restrict established sugar consumption in older children when they present to the dentist with tooth decay.

The aim of this qualitative thematic synthesis is to identify the "critical situations" when caregivers might be more likely to offer sugary drinks and snacks to infants aged 6-24 months, despite their intention to limit sugar intake. This age range is of particular interest because the foods and

drinks that the infant consumes are entirely controlled by caregivers. Critical situations are cues, or 'triggers' to action, which may be internal or external. Internal triggers might relate to stress, happiness or fatigue, for example, whereas external factors might relate to geographical location, time of day, or the influence of people around us. Both internal and external factors may lead to habitual behavior (Gollwitzer & Sheeran, 2006; Orbell, Hodgkins, & Sheeran, 1997; Webb & Sheeran, 2007), such as offering sugary drinks and snacks to infants, or older children. Identifying these critical situations is important because they can be harnessed to replace the unhelpful behavior with a pre-specified, goal directed alternative (Gollwitzer, 1999). This would involve the caregiver making specific plans to employ an alternative strategy in a situation where their habitual response would be to offer their infant sugary drinks and snacks.

We begin, therefore, by reviewing the literature to determine the broad influences on the food and drinks choices that caregivers make for pre-school children up to the age of five. We then move to synthesise the results of our literature review, to produce our research findings – namely, a set of inferences about the 'critical situations' when caregivers may be more likely to offer sugary foods and snacks to infants.

Methods

This qualitative systematic review is presented in accordance with the ENTREQ statement for enhancing transparency in the synthesis of qualitative research (Tong, Flemming, McInnes, Oliver, & Craig, 2012). A checklist showing where the review addresses each item of the ENTREQ statement is included in Supplemental File 1.

Research questions

1. What are the external and internal influences on caregivers of children aged 6 months -5 years living in high-income countries, in relation to what to give their child to eat and drink?
2. From the caregiver's perspective, what is the value of sugary drinks and snacks, and what are the negative consequences of not offering them to children aged 6 months to 5 years?

3. When are the 'critical situations' where caregivers may be more likely to offer sugary drinks and snacks to infants aged 6-24 months?

Systematically reviewing and analyzing the qualitative literature on caregiver food choices for children aged 6months – 5 years answered research questions 1 and 2. Research question 3 is answered by the thematic synthesis, which constitutes the findings of our review. Our review findings are based on, but take an interpretative step beyond, the results of the literature review.

Reflexivity statement

The authors of this qualitative systematic review draw on a wide range of experience including dental public health, public health nutrition, political theory, health services research and health psychology. The authors are in agreement with recent recommendations to reduce sugar intake in young children, but are aware from clinical experience that many caregivers find it difficult to do so in practice. We began with the hypothesis that this may be due to the many non-nutritive roles that sugary drinks and snacks have in family life. The ontological and epistemological approach taken by the authors is critical realist (Maxwell, 2010). That is to say, we accept that a 'real world' does exist beyond our construction of it, but that its understanding, as presented here, is inevitably based on the perspectives and constructions of the participants and authors of the primary studies, as well as our own points of view.

Inclusion and exclusion criteria

Type of studies: Four reviewers (Deborah Moore, Tom Goodwin, Anne-Marie Glenny, Paul R. Brocklehurst) screened each study title and abstract in duplicate. Eligibility criteria were that the studies used qualitative methods of data collection and analysis and were conducted in a high-income setting in order to increase the transferability of the findings to our particular context, the U.K (The World Bank, 2014). Studies presenting questionnaire-based information only, studies not published in English or abstracts without citations were excluded.

Participants: We initially aimed to limit our search to studies where the children were infants, aged between 6 and 24 months. However, due to the small number of studies returned by preliminary

searches, the inclusion criteria were extended to include caregivers of children up to 5 years of age. This is reflected in research questions 1 and 2 relating to pre-schoolers. However, to answer research question 3, we narrowed our focus to identify the critical situations where caregivers may be more likely to offer sugary drinks and snacks to infants (6-24 months). Where a 'critical situation' was based only on knowledge gained from studies with caregivers of older children, this is reflected in the statement 'some concerns about relevance' in our 'CERQual assessment of confidence' for that finding (see below). We use caregiver here as an inclusive term to refer to parents, grandparents, or legal guardians of children who have responsibility for the wellbeing of a child.

Phenomena of interest: The internal and external cues experienced by caregivers when choosing foods and drinks, especially sugary drinks and snacks, for their pre-school child or infant. Studies concerned with the decision to breastfeed or not were excluded.

Full-text articles were obtained for any abstract which was identified by any single reviewer and which appeared to meet the above inclusion criteria. Final decisions at the full text stage were made by consensus agreement between four review authors (D. Moore, T. Goodwin, A. Glenny and P. Brocklehurst).

Search Strategy

The search strategy for this thematic synthesis is purposive rather than exhaustive. We originally planned to develop the search strategy in an iterative fashion. However, the initial search returned 16 studies, (reported in 17 papers) which provided a varied sample of ethnicities and socio-economic status' populations from within our target context of high-income countries similar to the UK. We found that saturation of themes occurred after coding around 13 of the 16 studies. For these reasons it was decided to limit the search to the first iteration.

The electronic databases PsycINFO, Social Policy and Practice, ASSIA and Medline were systematically searched from the start of the database to October 2014. Searches used keywords and MeSH headings (in OVID). Filters designed by McMaster University to identify qualitative studies in Medline (92%

sensitivity, 92% specificity) and PsycINFO (86% sensitivity, 87% specificity) were applied (Mc Master University, 2014a; McMaster University, 2014b). The full search history for each database is presented in Supplemental File 2.

Quality assessment

Deborah Moore and Tom Goodwin critically appraised the studies using a checklist that contained 11 domains, based on the CASP (CASP UK, 2013) and JBI (The Joanna Briggs Institute, 2014) tools. The final format was agreed after piloting both the CASP and JBI checklists. The domains included were: aims; research design; recruitment strategy; data collection; reflexivity; adequate representation of participants' voices; findings; relationship of conclusions to interpretation and analysis; congruity across study design, methods and analysis; ethical issues and value. Each review author carried out his or her critical appraisal separately, with the final decision reached after discussion. No studies were excluded on the basis of quality. Rather, studies were classified as low, moderate or high quality and were used as such to inform the CERQual assessment of confidence in the review findings (see below).

Data extraction

Two authors, (Moore and Goodwin) separately extracted data regarding study characteristics, methods and conclusions, using the standardized Data Extraction Template for Qualitative Evidence, produced by the Joanna Briggs Institute (JBI) (The Joanna Briggs Institute, 2014). Any discrepancies were addressed by agreement between the two reviewers. Following Thomas and Harden, 2008 (Thomas & Harden, 2008), the data extracted for the thematic synthesis were the entire results sections of the primary papers, treating the text from the paper in the same way as a transcript from a primary source. At this stage, the review questions were put aside and the whole of the results sections were included as 'data'. Each reviewer individually annotated the paper manuscripts by hand and applied initial codes to describe discreet 'units of meaning' in the text. The two authors then met to discuss the codes and reach further agreement on meaning and terminology. One review author, Tom Goodwin, added the agreed codes to NVivo 10 software (QSR International) and extracted the

appropriate sections of text for that code, directly from the electronic version of the manuscript. Existing codes were then applied to each subsequent paper, where applicable, or new codes were created, if necessary, in a manner similar to the constant comparative method (Glaser & Strauss, 1967; Urquhart, 2013). This process resulted in 52 initial codes, which were subsequently condensed into 33 non-hierarchical descriptive themes that represented a close summary of the content of the 17 papers.

Synthesis

Moore and Goodwin examined the 33 descriptive themes in light of the review's first two research questions, with a view to producing the 'analytical themes' given in the results section below (Thomas, J. & Harden, A., 2008). Concepts in the 33 descriptive themes that could not inform these research questions were left behind at this stage. Examples of concepts that were not taken forward are: beliefs about physical activity; or mothers concerns about their own weight. The authors worked together to achieve consensus on the organisation of the analytical themes, as well as to ensure that the coded sections of text for each theme were internally consistent and that they adequately supported the phenomenon. The analytical thematic structure starts with the 'first-order' themes, which are essentially the descriptive themes found in the original papers. The second order themes represent areas of concern for caregivers. These areas of concern are then organised as third order themes, along a continuum of widening influence, from the parent-child dyad up to the influence of wider society.

Following the thematic synthesis approach (Thomas, J. & Harden, A., 2008), Moore and Goodwin then proceeded to answer the third research question: "What are the 'critical situations' where caregivers may be more likely to offer sugary drinks and snacks to infants?" This more interpretive step involved, first, a consideration of how the analytical themes identified in the literature review could apply to food choice for infants in general, and second, what could therefore be inferred about the likely 'high-risk' scenarios where sugary drinks and snacks may be offered to them. This process necessitated some level of conceptual innovation due to the fact that we were

asking a question that had not been considered in the primary studies. To facilitate this process, we drew upon our knowledge and experience from the fields of nutrition, public health, clinical dentistry, political theory and sociology. Christopher J. Armitage and Paul R. Brocklehurst then reviewed the proposed critical situations to ensure that they were plausible, that they were supported by the thematic synthesis and that they constituted appropriate definitions of a 'critical situation'.

The 'critical situations' are presented as review findings in table 2. To describe our confidence in the individual review findings, we used the Confidence in the Evidence from Reviews of Qualitative Research Approach (GRADE-CERQual) (Lewin et al., 2015). Following this approach our confidence in each review finding was weakened if we had concerns about the contributing body of evidence. Confidence was assessed by making a judgement across 4 domains: methodological limitations, relevance, coherence, and adequacy, outlined in detail below. Supplemental File 4, *CERQual Judgment Table*, gives the full reasoning behind each CERQual assessment of confidence in our findings.

- The **methodological limitations** refer to the extent to which there are problems in the design or conduct of the primary studies that contributed evidence to one of our review findings. This domain was assessed using the quality assessment described above. Where we had concerns about the design or conduct of the studies that contributed to a particular finding, our confidence in that finding was reduced.
- The **relevance** of the included studies to the review question refers to the extent to which the body of evidence from the primary studies supporting the review finding is applicable to the context of this review - i.e. caregivers of infants aged 6-24 months, living in a high-income, developed country setting. If a review finding was based entirely upon studies where the children of the caregivers were aged over 24 months, our confidence in that finding was reduced due to concerns about the 'relevance' of the evidence. However, if we felt that a specific finding would be equally applicable to caregivers of infants and older children, our confidence in the review finding was not particularly weakened.

- The **coherence** of a review finding refers to the extent to which it is well grounded in data from the supporting primary studies and provides a convincing explanation for the patterns found in these data. Where variation was found across data from individual studies with no convincing explanation for this variation, we were less confident that the review finding is a coherent reflection of how caregivers choose food for infants.
- **Adequacy** of data refers to an overall determination of the degree of richness and the quantity of data supporting a review finding. Our confidence in a finding was weakened when it was supported by data from only one or few primary studies, settings or relevant groups, or the data supporting it were very thin.

Translating the analytical themes into critical situations and carrying out the CERQual assessment of confidence in our findings was carried out by Deborah Moore and Tom Goodwin.

Results

General overview

A total of 17 full-text articles were included, which reported 16 primary studies conducted in the USA (9 studies), UK (3 studies), Australia (3 studies) and Denmark (1 study). The systematic search flow diagram is presented in Supplementary File 3. A summary of the included studies and the results of our methodological quality assessment are provided in Supplemental File 4, *Summary Table of Included Studies*.

The themes related to caregiver food choices for pre-schoolers are summarised in Table 1 and are described in the narrative of the results section. The final result of our thematic synthesis; the 'critical situations', where caregivers may be more likely to offer sugary drinks and snacks to infants, are presented in table 2 as our review 'findings'. Our confidence in the evidence that underpins each finding is described by the CERQual assessment, also in Table 2.

[INSERT TABLE 1 AND TABLE 2 HERE]

Child focused factors

Behavior management

In many studies, caregivers reported using foods such as chocolate, sugary drinks and sweets, or fast foods to manage their child's behavior. This included using these foods to reward good behavior (Carnell, Cooke, Cheng, Robbins, & Wardle, 2011; Hughes, Sherman, & Whitaker, 2010; Lindsay, Sussner, Greaney, & Peterson, 2010) to "*treat*" children (Carnell et al., 2011) "*motivate*" (Lindsay, Sussner, Greaney, & Peterson, 2009) or make them feel "*special*" (Tipton, 2014). *'"I felt it was hard on S. to be dragged round on my errands, and that a couple of small sweets after a good breakfast wouldn't hurt."'* (Carnell et al., 2011)

"Treat" foods were also used to manage a child's behavior using bribery, or as a reward for eating other healthier foods (A Horodynski & Arndt, 2005; Hughes et al., 2010; Lindsay et al., 2010; Moore, Tapper, & Murphy, 2010); *'"If you quit crying, you know, you might get that candy bar after supper. But if you keep crying after I've already told you, then you won't."'* (Hughes et al., 2010). *"… mothers reported promising their children sweets and ice cream to reward a good behavior or to get them to do something. In some cases, mothers also reported using "bad foods" to get their children to eat "good foods."* (Lindsay et al., 2010)

Caregivers also used foods to distract children or to keep them quiet (Carnell et al., 2011; Omar, Coleman, & Hoerr, 2010; Tipton, 2014); *'"They'll [sugar sweetened beverages] kind of keep him, you know, pre-occupied"'* (Tipton, 2014). *'"The treat is a chocolate bar and a packet of crisps just for something more interesting to keep her occupied while I shopped I suppose"* (Carnell et al., 2011).

Socialisation of the child

Families in many of the studies seemed to operate according to their own rules, rituals and routines, as such creating a distinct 'food culture' within the home. The food culture relates to what foods are seen as acceptable, at what times (Carnell et al., 2011; Herman et al., 2012; Moore et al., 2010; Nielsen, Michaelsen, & Holm, 2013). Caregivers emphasised the importance of teaching their child a "'*normal or acceptable way of eating*'" (Carnell et al., 2011), for example; *'"She can be very*

greedy with sweets and chocolate and crisps. She can have one a day – like yesterday morning she said 'can I have a packet of crisps, it's 11 o'clock in the morning.'" (Moore et al., 2010)

The importance for caregivers of being responsive to their child's preferences and encouraging their child's growing autonomy was a common theme (Carnell et al., 2011; Duncanson & Burrows, 2013; Herman et al., 2012; Horodynski, Brophy-Herb, Henry, Smith, & Weatherspoon, 2009; Lindsay et al., 2010);

> *"Mothers repeatedly indicated that children were unique with regard to their food preferences — how much of each type of food they would usually eat on any given day. Mothers appeared to honor and value this expression of their child's individuality and wanted to be responsive to it."* (Herman et al., 2012).

Caregivers also reported using food to teach life lessons, such as the notion of not always getting what you want; *'"Sometimes they get mad and fall out but, that's something you have to deal with. We don't always get what we want. That's life."'* (Herman et al., 2012).

Conversely, exposure to unhealthy snack foods was seen as beneficial by caregivers in some studies, deemed necessary in order to teach control and self-discipline; *'" I think the kids now and then need to eat a little bit of rubbish . . . that little bit for balance so they know when to control themselves."'* (Pagnini, Wilkenfeld, King, Booth, & Booth, 2007). *'"Teaching the child some rules of conduct about the intake of confectionery, fizzy drinks and cake was therefore an important concern of mothers."'* (Nielsen et al., 2013).

The notion of food for pleasure or enjoyment emerged as a theme in just two of the studies. In one sense this was connected to the idea of teaching children to try and enjoy a variety of foods (Carnell et al., 2011) but in another sense it was merely about giving children food that was '"*palatable and pleasing*"' (Kalinowski et al., 2012).

Despite the importance attached to the notion of restraint, caregivers in some studies mentioned special occasions, such as celebrations, or weekends as exceptions where children should be allowed to consume less healthy foods (Carnell et al., 2011; Duncanson & Burrows, 2013); *'"It's not worth fighting it is it, [Christmas is] one time of the year and that's it!'"* (Carnell et al., 2011)

Promotion of child health

One of the most common factors reported to affect caregiver food choices was the recognition that providing a balanced and varied diet was very important (A Horodynski & Arndt, 2005; Carnell et al., 2011; Duncanson & Burrows, 2013; Moore et al., 2010; Nielsen et al., 2013); *'"My responsibility is to expose them to foods from all of the food groups and make sure that they're all in good balance."'* (Duncanson & Burrows, 2013).

Limiting sugar intake to prevent cavities or hyperactivity was reported to be a common goal (Carnell et al., 2011; Herman et al., 2012; Tipton, 2014); *'"He wouldn't be able to have sweets or a cake or biscuit, because I don't like him to have too many sweet things really. Because of his teeth I suppose."'* (Carnell et al., 2011) *'"She knows I don't want my kids eating candy, because I don't want their teeth all messed up"'* (Herman et al., 2012).

Whilst these broad principles were seen as 'common sense', in some studies the authors noted that caregivers had a tendency to overestimate their nutrition knowledge or were unable to recall specific nutritional guidelines (A Horodynski & Arndt, 2005; Duncanson & Burrows, 2013; Hildebrand & Shriver, 2010; Omar et al., 2010); *'"I can recall, I mean two, one to two pieces of fruit a day, I think it's three to four serves of vegetables a day; I couldn't tell you the amount of meat, I honestly don't know."'* (Duncanson & Burrows, 2013).

One study reported that nutrition messages were seen by some caregivers as less important than fitting in with the general dietary patterns of the rest of the family; *'"Still, some limits to such adjustments of the family food pattern were reported. Although the liver and heart were believed to be healthy, many mothers refused to make this part of the family meal repertoire…"'* (Nielsen et al., 2013).

Caregivers in some studies reported that their feeding choices were influenced by their perception of both the child's health, as well as the health history of their immediate family. There was evidence that caregivers tended to be more restrictive if there was a family history of obesity or chronic disease (Carnell et al., 2011; Duncanson & Burrows, 2013; Lindsay et al., 2010); *'"Because we've got, our family, my dad, my brother, they're all very big people and they are bigger because they eat lots of sometimes food. So I think that's why I'm so stern on what I teach my kids too because yeah, it's*

hereditary"' (Duncanson & Burrows, 2013).

Conversely, caregivers in a range of studies reported being more permissive if they perceived their child to be fussy, underweight or unwell (Carnell et al., 2011; Omar et al., 2010; Pagnini et al., 2007); *'"My younger boy he was underweight, he has sickle cell disease so he was underweight so I get very worried if he doesn't eat as well and any time he eats I'm very happy, I let him eat anything he wants."'* (Carnell et al., 2011).

Everyday lives of caregivers

Desire for family harmony

The desire to preserve family harmony, by avoiding conflict, and disruption to routines and schedules emerged as influencing the food choices that caregivers make for their children. In a number of studies, caregivers mentioned that they would ignore their own feeding goals or nutritional advice to avoid conflict or disturbance to other members of the family (A Horodynski & Arndt, 2005; Carnell et al., 2011; Freeman & Stevens, 2008; Hughes et al., 2010; Nielsen et al., 2013; Tipton, 2014). In two studies, caregivers seemed particularly concerned with limiting disruptions during the night (Freeman & Stevens, 2008; Nielsen et al., 2013). This was cited in one study as a reason to put a bottle in the child's bed at night, against advice from health professionals.

> *'"My Jimmy, he couldn't stand the child squealing and crying at night. We hadn't slept for weeks and Jimmy and me were fighting like and Jimmy's shouting at me like; 'For flip sake give that child a bottle, I can't be doing without sleep'. So I did, the child sleeps, no longer screams the house down at night."'* (Freeman & Stevens, 2008)

In order to avoid conflict and to promote family harmony, a number of caregivers mentioned that they would let children consume "*whatever they liked*" (Carnell et al., 2011; Nielsen et al., 2013). In many cases, this resulted in unhealthy choices (A Horodynski & Arndt, 2005; Freeman & Stevens, 2008; Tipton, 2014); *'"We'll just give it [fast food] to her if she's throwing a fit"'* (A Horodynski & Arndt,

2005). *'"Offering [sugar sweetened beverages] to calm children who are "acting out" arose as a common practice."'* (Tipton, 2014).

Food refusal was cited as a common disruption in a number of studies (Duncanson & Burrows, 2013; Horodynski et al., 2009; Moore et al., 2010; Tipton, 2014). In order to promote family harmony and avoid conflict caregivers may be more likely to offer infants the foods and drinks that they know they will eat. Many caregivers believe that children intrinsically dislike vegetables, and this was seen as a limitation on food choices for young children, and caregivers sometimes unwittingly reinforced this idea; *'"So we say, have it with a bit of meat or something like that to try to mask that horrible flavour of the particular vegetable"'* (Duncanson & Burrows, 2013).

In contrast to the common belief that children dislike vegetables, caregivers in one study expressed the belief that *"…the sweet taste of SSBs made them easier to serve to preschoolers than more healthful beverages".* (Tipton, 2014)

Caregivers were very concerned that their child should not be hungry, and this meant that they sometimes found it hard to say no to requests for snack foods or encouraged their child to eat more than they wanted to (Carnell et al., 2011; Hughes et al., 2010; Moore et al., 2010; Nielsen et al., 2013; Omar et al., 2010); *'"I think it is hard to say no because you don't know if they're hungry or not. 'Cause you're not in their belly."'* (Hughes et al., 2010).

Caregivers' strong desire to avoid a hungry child meant that they sometimes resorted to offering sugary snack foods, because they know that their child will eat them (A Horodynski & Arndt, 2005; Carnell et al., 2011; Omar et al., 2010); *'"…He's always going to eat a Snickers or a candy bar or something… I'll let him eat that without arguing about eating the junk food [a] lot of times just as long as I know he's filling up on something'"* (Omar et al., 2010).

In a number of studies, caregivers indicated that this concern to avoid a hungry child was in part driven by a desire to minimize the potential disruption to family harmony caused by a hungry child. This was seen as especially important to avoid between planned mealtimes and again, throughout the night; *'"You want her to be very full at night, so that I can sleep as much as possible."*

(Nielsen et al., 2013). *"'I offered...more pasta as I didn't want her to say she was hungry later at bedtime.'"* (Carnell et al., 2011).

There were varying levels of resolve to limit unhealthy foods and drinks reported by caregivers, both within and between studies. A minority of participants in some studies reported a strong resolve to say 'no' to their children's demands for foods and drinks in the face of disruptive behavior (Carnell et al. 2011; Herman et al. 2012; Nielsen et al. 2013; Peters et al. 2014). "'*I'll say if he can or he can't*"' mentioned one parent (Carnell et al., 2011); "'*whatever you do it's still a no*"' stated another (Peters et al., 2014). *"'Yeah, they have to ask me first and if I say 'no,' that means no, point blank. I don't care if you're mad at me, I don't care if you cry. You can't have it...'"* (Herman et al., 2012). Whereas some caregivers found saying "no" much more difficult; *"'I give in sometimes. I give in to her because she looks like me. Her eyes are big and she just bats her eyes and she's like, "Ma, please?" And then I'm like, "Okay".'"* (Herman et al., 2012)

Of the four studies where caregivers reported a strong resolve, three were from samples of moderate or higher socio-economic status (Carnell et al., 2011; Nielsen et al., 2013; Peters et al., 2014). In the most contrasting study, where choices regarding child feeding was being led almost entirely by a desire to preserve family harmony (Freeman & Stevens, 2008), the sample contained families who were coping with high background levels of conflict and disharmony - described by the authors as "chaotic lives"; *"'I can't stick the screaming at night. The only way to get him over (to sleep) is to give him a bottle of milk.'"*(Freeman & Stevens, 2008). We hypothesise that a high degree of existing family disharmony may limit caregivers' resolve to adhere to their own feeding goals.

Competing demands

The competing demands that caregivers face in their everyday lives appears to influence the food choices they make for their infants. Caregivers in some studies discussed how the need to keep to family schedules (Carnell et al., 2011; Nielsen et al., 2013), work commitments both inside (Lindsay et

al., 2009; Nielsen et al., 2013) or outside of the home (Freeman & Stevens, 2008; Lindsay et al., 2009; Nielsen et al., 2013; Omar et al., 2010), the provision of care and "*treatment for special-needs children*" (Omar et al., 2010), or "*busy lives*" in general (Peters et al., 2014) all created time pressures which affected food choices for their children.

> *"'I don't cook and I'm the only one who can cook…but I'm never there. There will be nights I'll work 18 hours straight and I'll be up at 6:00 in the morning and go to work, not get home until 10, 11, 12 at night, and got to be up at 6:00 the next morning…When I do feed her, it's McDonald's, Burger King, something like that [that] I can grab and go…because I don't have the time."* (Omar et al., 2010)

Some caregivers stated that they found it harder to be consistent in how they fed their child if they were "*tired*" or "*rushed*" (Duncanson & Burrows, 2013; Hughes et al., 2010), where others reported that they were more likely to eat out at restaurants when they did not "*feel like cooking*" (Lindsay et al., 2009). The convenient packaging of sugar sweetened beverages was a consideration for some caregivers and cited as a positive attribute of sugary drinks (Tipton, 2014).

Caregivers in a few studies mentioned that their own need for peace and quiet sometimes affected the food choices they made for their young children (Freeman & Stevens, 2008; Hughes et al., 2010; Omar et al., 2010); *'"My patience had done run out and I gave him the cake . . . so I could sit down and relax'."* (Hughes et al., 2010).

Caregivers reported that they found it harder to set limits and were more likely to "*give in*" to children's demands when they had higher background stress levels due to "*strain and fatigue from work*" (Hughes et al., 2010). "'*Sugary drinks they, I guess it'll keep a kid calm cause sometimes…cause if a parent comes home from work, they don't feel like hearing no whining and crying and- alright, here*.'" (Tipton, 2014)

In most of the studies caregivers used highly emotive language to describe their experiences of feeding young children. They spoke of feeling "f*rustrated*", "*exasperated*" and "*anxious*" (Duncanson & Burrows, 2013; Herman et al., 2012) as well as experiencing "*joy*" "*pride*", "*gratification*" and "*delight*"

(Duncanson & Burrows, 2013; Freeman & Stevens, 2008; Kalinowski et al., 2012; Moore et al., 2010), depending on their child's response to the foods and drinks they offered; *'"I don't know (long, silent pause). You just don't know, you just try anything. You try and get anything down their throat… I'd say he's made me ill."'* (Moore et al., 2010).

Some described feeling "*guilty*" or "*hurt*" when denying children sweets or snack foods; *'"Sometimes it hurts you as a parent more than the child when you say no. I don't know why though. I don't like my son looking all upset or crying…"'* (Herman et al., 2012). In some cases, caregivers fed their child in a way that ameliorated their own difficult emotions; *'"If you don't have time, then you start to feel guilty and then you go and buy for the kids that new cereal with sugar…"'* (Lindsay et al., 2009). *'"Setting limits . . . it's hard. . . I think parents feel guilty. I think it's a big part of it….you don't see them until six, seven o'clock at night. It's hard to say no. You feel sorry.'"* (Hughes et al., 2010)

Wider society

Social networks

Food choices for infants appear to be influenced by the social networks around the family and by the memories caregivers have of their own feeding experiences as children. Caregivers in some studies talked about how they tried to improve upon their own childhood experiences (Herman et al., 2012; Kalinowski et al., 2012; Moore et al., 2010), which generally had the effect of them being more permissive than their own parents; *'"I just want my children to have the things that I didn't have. I didn't have the choice to ask or, you know, I mean I can't speak for everyone in this room but my childhood wasn't very good growing up. So I just try to give them the highlights and things that I didn't have."'* (Herman et al., 2012)

In one study of recent South American immigrants to the US, there was a cultural perception that having a "*chubby*" or "*cute fat*" infant was desirable and that if a child was thin it was a sign of bad parenting (Lindsay et al., 2010); *'"In the Latino culture we have the tendency to think that the kids are healthy when they are fat"'* (Lindsay et al., 2010)

Grandparents and other family members were often discussed as a negative influence due to their tendency to indulge children with sweets and treat foods (Duncanson & Burrows, 2013; Herman et al., 2012; Hughes et al., 2010; Lindsay et al., 2010; Omar et al., 2010; Pagnini et al., 2007; Peters et al., 2012; Tipton, 2014); *'"Children say grandma is better. Grandmother feeds them candy and soda . . . they know they can have soda at grandma's house."'* (Lindsay et al., 2009). In some cases grandparents were reported as seeing food as an expression of love (Herman et al., 2012; Pagnini et al., 2007).

> *'"The worst ever is with my mom's mom, because my mom does it [feed the child sweets] but my grand mom feels like she did it with me so she's going to do it with my son. And she's at that whole stage where she's like, 'I'm not going to be here that much longer so I want them to love me and be happy with me'".* (Herman et al., 2012)

Mothers often reported being undermined by their own parents, grandparents or parents-in-laws when attempting to restrict sweets and snacks (Herman et al., 2012; Hughes et al., 2010; Lindsay et al., 2010; Pagnini et al., 2007; Tipton, 2014). As grandparents often provide free childcare, parents may find it especially difficult to disagree with them over food choices for their infants (Duncanson & Burrows, 2013).

However, in some cases the influence of grandparents was discussed as a positive influence (Duncanson & Burrows, 2013; Pagnini et al., 2007) and in one study fathers reported that they would be more likely to trust their parental advice on child feeding than that of a professional, even if it was contradictory; *'"I always stick to what my in-laws and parents say about that. I would never bring in nobody else, because I've been with them a lot and I'd rather be with somebody I know instead of somebody else telling me."'* (Omar et al., 2010).

Some caregivers found that their children's requests for food were influenced by what their children's friends or other siblings were eating (Carnell et al., 2011; Duncanson & Burrows, 2013; Horodynski et al., 2009); *'"I don't want to make him unhappy saying he can't have things and other children can, I don't think it would be very nice."'* (Carnell et al., 2011)

In one study caregivers mentioned that they felt social pressure to give their children treats, which included food; *'"We feel like we've got to give our kids things all the time, they have got to have the best toys, they've got to have this because they want it, we have got to take them to McDonald's . . . '"* (Pagnini et al., 2007).*"For some, treats were almost seen as entitlements, and not providing them was referred to as a form of deprivation"* (Pagnini et al., 2007)

Food environment

Availability and access to foods appear to be a significant influence on food choices for infants. Cost was cited as a common consideration (Carnell et al., 2011; Hildebrand & Shriver, 2010; Horodynski et al., 2009; Lindsay et al., 2009; Omar et al., 2010; Pagnini et al., 2007; Peters et al., 2012; Tipton, 2014). For some families, this meant the substitution of certain items for cheaper versions; "'*I'll say ''No you're not having that, it's 60p for a yoghurt, choose something else.'"'* (Carnell et al., 2011). Whereas in other studies, where incomes were more limited, cost was specifically cited as a reason for not buying fruit (Hildebrand & Shriver, 2010; Horodynski et al., 2009; Lindsay et al., 2009; Omar et al., 2010); *'"Sometimes, not always, but some months, you have to restrain yourself to just food, nothing else but food and you can't buy such and such cereal or a lot of fruit because fruits are expensive."'* (Lindsay et al., 2009). *'"The only thing that keeps me from buying them [fruit] would be expense."'* (Hildebrand & Shriver, 2010). In contrast, one reason that caregivers gave for choosing sweetened soft drinks were that they were less costly than other, more healthy drinks (Tipton, 2014).

Caregivers in some studies discussed the negative impact of television advertising, product placement and supermarket and fast food chain promotions on children's food preferences, though this may be more applicable to caregivers of older children, rather than infants (Duncanson & Burrows, 2013; Lindsay et al., 2009; Pagnini et al., 2007; Peters et al., 2012; Tipton, 2014).

Caregivers felt that day care had an important place in promoting healthy eating and they all expected that their child would receive nutritious food at nursery and day care centres (Duncanson &

Burrows, 2013; Nielsen et al., 2013; Pagnini et al., 2007; Peters et al., 2014). However, it is not clear whether or not their expectations were being met.

Review findings

The findings of this thematic synthesis are presented in Table 2. The findings answer research question 3: What are the 'critical situations' where caregivers may be more likely to offer sugary drinks and snacks to infants? Each of the critical situations was inferred from the analytical themes discussed in the results section and summarised in Table 1. This final step involved some interpretative work, as none of the original studies were specifically answering this question. Our confidence in how well the evidence supports each particular finding is reflected in the CERQual assessment of confidence given alongside it. A detailed explanation of how we arrived at our CERQual assessment, stating the reasons for our judgement across each domain (methodological limitations, relevance, adequacy and coherence) is given in Supplemental File 5.

Discussion

We have identified several 'critical situations' where caregivers may be more likely to offer infants sugary drinks and snacks. Implications for interventions which seek to reduce sugar consumption for the prevention of dental caries will now be explored in more detail.

We identified that caregivers may offer sugary drinks and snacks to infants, as bribes or rewards, in order to manage behavior. This type of feeding has been shown to increase children's preference for and desire to eat the reward foods (Lu, Xiong, Arora, & Dubé, 2015). As an alternative, effective non-food rewards include verbal praise, non-verbal praise such as smiles or thumbs-up, physical affection and token systems (Fedewa, 2015). Furthermore, an authoritative general parenting style, which is characterised by high warmth and responsiveness and clearly communicated and consistent guidelines for behavior, has been shown to be optimum with regards to the

management of eating behaviors in children (Pinquart, 2014; Sleddens, Gerards, Thijs, de Vries, & Kremers, 2011). Families identified as being at high risk of caries should be encouraged to manage behavior in their infants using an authoritative parenting style and non-food based rewards. In some cases, referral to a parenting support programme may be of benefit.

Food culture and family routines were found to be an important influencing factor for caregiver food choices. Nutritional interventions to prevent caries in infants should therefore address the food culture and environment of the whole household, as opposed to the child themselves. This whole family approach has also been shown to be an effective strategy for childhood obesity prevention (Willis, Roberts, Berry, Bryant, & Rudolf, 2016).

We found that caregivers may be more likely to offer infants sugary drinks and snacks if they perceive them to be underweight or unwell, or conversely, to restrict them if they perceive their child to be at risk of obesity. Overt restriction is defined as that which can be detected by the child(Ogden, Reynolds, & Smith, 2006) and has been found to increase interest in and desire to consume the restricted food (Brown, 2004; Fisher & Birch, 1999; Ogden et al., 2006). It is also the feeding behavior most strongly linked to childhood obesity as it teaches children to rely on external cues, rather than hunger, to know when and how much to eat (Pinquart, 2014). Advising caregivers to restrict sugary drinks and snacks specifically for infants identified as being at risk of or already suffering from caries may therefore be counterproductive. This reinforces the idea above that any intervention must address the household food environment, rather than the diet of a specific child.

It has been proposed that the optimum approach to child feeding is for caregivers to choose 'which' foods are offered as well as 'when' and 'where' those foods will be eaten (Eneli et al., 2015; Satter, 1986; Satter, 1995). The child can then be allowed to have control over 'what' and 'how much', if any, of the offered foods to eat. This is a way of achieving 'covert' restriction (Ogden et al., 2006) which is what happens naturally when caregivers have healthier eating habits and are therefore more likely to model healthier behaviors (Ogden et al., 2006). Offering children a 'guided' choice between two or three healthy options also supports the stated desires of caregivers to encourage the

development of their child's autonomy and to be responsive to their child's preferences. Interventions to support caregivers to use guided choices, as well as covert rather than overt restriction, may be fruitful for the prevention of caries in infants.

Negative caregiver emotional states, high background stress levels due to competing demands and family dis-harmony were all identified as situations that may increase the likelihood of caregivers offering sugary foods and drinks to infants. Strategies which increase family resilience, including the establishment of family routines, addressing family stress and facilitating effective communication patterns have recently been identified as possible approaches that may be of value in childhood obesity prevention (Halliday, Palma, Mellor, Green, & Renzaho, 2014) and may also be warranted as interventions to prevent caries.

Caregivers may be more likely to offer infants sugary drinks and snacks when the food environment encourages them to do so. To help make 'healthier choices the easier choice' (Koelen & Lindström, 2005), caregivers need access to healthy food and drink options that are no more expensive than less healthy options, and are just as convenient. Policy options to address the perverse incentives built into the food system include: taxes on sugar-sweetened beverages (Andreyeva, Chaloupka, & Brownell, 2011); changes to agricultural subsidies, fruit and vegetable pricing policies (Drewnowski & Darmon, 2005); restrictions on product placement, regulations on portions sizes and labelling, and limiting marketing to children (Cornelsen, Green, Dangour, & Smith, 2014).

Limitations and strengths of this thematic synthesis

There were several limitations to this thematic synthesis. The review was only able to include English language studies, which means that the review findings are less applicable to caregivers in non-English speaking high-income countries. Additionally the search strategy was confined to electronic database searching, as opposed to hand searching or searching grey literature.

The majority of the included studies included low socioeconomic status (SES) groups, which may limit the transferability of some of our findings to higher SES groups. Where a particular finding

was supported only by studies from low SES groups, we downgraded our CERQual assessment of confidence, due to concerns about the 'adequacy' of the body of evidence that contributed to it.

Another limitation of the review was that the majority of the primary studies were conducted with caregivers of children older than 24 months, and most studies included mothers as opposed to fathers or grandparents. For those findings based solely on studies with caregivers of children older than 24 months, or only on studies with mothers, we again downgraded our CERQual assessment of confidence, due to concerns about the 'relevance' of the body of evidence. However, themes that we considered were only applicable to older children (e.g. TV advertising directed at children) were not taken forwards as critical situations that might affect food choices for infants. Furthermore, most of the themes identified were more or less applicable to caregivers of infants as well as older children, e.g. "caregiver emotions" and "busyness".

The CERQual assessment thus allowed us to use concepts taken from studies with caregivers of older children, but to account for this in a transparent way when producing our findings. This is particularly important when intervention strategies are required, but there little qualitative research available that focuses on the specific group in question. Where our confidence in a 'critical situation' is low, we anticipate that with further expansion of the research base, our finding could change and we would be reluctant at this stage to develop interventions based upon it. Where our confidence in a 'critical situation' is moderate or high, we feel it would be reasonable to develop interventions to help caregivers address the situation.

There are also several strengths to this review. To our knowledge, this is the first systematic review and thematic synthesis that has identified 'critical situations' where caregivers may be more likely to offer sugary drinks and snacks to infants. In order to answer our research questions, we have described the general influences on caregiver food choices for preschoolers, then gone beyond this to compose a list of situations that may offer opportunities for interventions to reduce sugar consumption in infants, before habits and feeding preferences become established.

We have reported this work according to the 'enhancing transparency in reporting the synthesis of qualitative research' (ENTREQ) statement (Tong et al., 2012). Using the thematic synthesis method (Thomas & Harden, 2008), we were able to treat all of the results sections of the primary studies as data, which allowed for a deeper exploration of the concepts included in the studies than might be expected when extracting only the themes from a study. Using the CERQual approach to assess our confidence in the findings of the review gave us a rigorous method to follow which encouraged us to be transparent about the limitations of our evidence base (Lewin et al., 2015) and allows the reader to assess whether they agree with our findings. Supplemental File 5, *CERQual Judgment Table*, gives the full reasoning behind each CERQual assessment.

Implications for future research

Having identified some of the critical situations in which caregivers are more likely to offer sugary drinks and snacks to infants, it would be valuable to develop interventions that can support caregivers to overcome these critical situations. Implementation intentions, or "if-then" plans offer a concise method of linking critical situations with pre-specified, desirable responses, to create new habits (Armitage, 2007; Gollwitzer & Sheeran, 2006). They bridge the gap between intention and action by *linking* critical situations, or cues ("if"), with an associated appropriate response ("then") (Webb & Sheeran, 2007). An example "if-then" plan for avoiding offering an infant sweets might be; "***If*** [name] has done something well…***then***…I will reward them using a sticker" (instead of sweets). If-then plans have been shown to be effective in improving dietary intake, encouraging smokers to quit, reducing alcohol consumption and increasing physical activity (Hagger & Luszczynska, 2014). Future research exploring their utility in supporting caregivers to address critical situations related to infant feeding is warranted.

Conclusions

Using the primary qualitative literature on food choices for pre-school children, this thematic synthesis has identified some of the 'critical situations', or triggers, for caregivers to offer sugary

drinks and snacks to infants. The results suggest that food choices for infants are not based solely on long-term health goals, but instead on a complex range of factors such as behavior and emotional state, family functioning, work commitments, social and cultural influences and availability of and access to healthier foods. Interventions that seek to reduce sugar intake in infants may be more successful if they provide caregivers with practical support to replace the non-nutritive functions of sugary foods and drinks as opposed to relying on an information-giving approach.

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No authors have any competing interests

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Ethics statement

An ethics statement was not required for this work

Supplemental files

1: Adherence to 'Enhancing Transparency in Reporting the Synthesis of Qualitative Research' (ENTREQ) Statement.

2: Full Search History

3: Systematic Search Flow Diagram

4: Summary Table of Included Studies

5: CERQual Judgment Table

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Table 1: Analytical Theme Structure

Third order	Second order	First order
Child centred factors	Behaviour management	Bribery and distraction
		Rewards and treats
	Socialization of the child	Family food culture
		Encouraging autonomy
		Teaching restraint
		Special occasions
		Food for pleasure
	Promotion of child health	Balance and variety for health
		Nutritional knowledge
		Perception of child health risks

The everyday world of caregivers	Desire for family harmony	Avoidance of hunger Food to avoid conflict Parental resolve The problem of fussy eating
	Balancing competing demands	Busyness Convenience Need for peace and quiet Parental emotions
The influence of wider society	Being part of social networks	Caregiver upbringing and culture Parent's and child's peers Grandparents
	Responding to the food environment	Advertising and marketing

		Availability and access Food costs Expectation of health promoting childcare

Table 2: Review Findings

'Critical situations' where caregivers may be more likely to offer sugary drinks and snacks to infants	Overall CERQual assessment of confidence	Explanation for CERQual assessment of confidence	Studies contributing to finding
Child-centred factors			
Behaviour management: Caregivers may be more likely to offer sweet drinks and snacks in situations where an infant is upset, bored, or is seen as deserving a reward or a 'treat'.	Moderate	Graded as moderate confidence because of some concerns about relevance, minor methodological limitations and minor concerns about adequacy.	7 studies (A Horodynski & Arndt, 2005; Carnell et al., 2011; Hughes et al., 2010; Lindsay et al., 2009, 2010; Moore et al., 2010; Omar et al., 2010; Tipton, 2014)

Socialization of the child: Caregivers may be more likely to offer sweet drinks and snacks to infants during special occasions and celebrations, or if sugary foods are seen as part of the 'food culture' of the family.	Moderate	Graded as moderate confidence because of moderate methodological limitations, and minor concerns about relevance and adequacy.	9 studies (A Horodynski & Arndt, 2005; Carnell et al., 2011; Duncanson & Burrows, 2013; Herman et al., 2012; Horodynski et al., 2009; Kalinowski et al., 2012; Lindsay et al., 2009; Nielsen et al., 2013; Peters et al., 2014)
Promotion of child health: Caregivers may be more likely to offer sugary drinks and snacks to infants if they perceive that the infant is unwell, or has a history of being underweight or low birth weight.	Moderate	Graded as moderate confidence because of some concerns about relevance, minor concerns about adequacy and minor methodological limitations	5 studies (Carnell et al., 2011; Duncanson & Burrows, 2013; Lindsay et al., 2010; Omar et al., 2010; Pagnini et al., 2007)
The everyday world of caregivers			

Desire for family harmony: Caregivers may be more likely to offer sugary drinks and snacks if infants are disturbing other members of the family, or are disrupting family routines due to crying, hunger or food refusals. This may be more important in families with higher levels of existing dis-harmony.	Moderate	Graded as moderate confidence because of moderate methodological limitations and some concerns about relevance.	11 studies (A Horodynski & Arndt, 2005; Carnell et al., 2011; Duncanson & Burrows, 2013; Freeman & Stevens, 2008; Herman et al., 2012; Hughes et al., 2010; Moore et al., 2010; Nielsen et al., 2013; Omar et al., 2010; Peters et al., 2014; Tipton, 2014)
Competing demands: Caregivers may be more likely to offer infants sugary drinks and snacks when they are busy, tired, rushed, or struggling to cope with negative emotions. This may become more important if caregivers are coping with negative emotions and difficult life circumstances in general.	High	Graded as high confidence because there were only minor methodological limitations and minor concerns about relevance.	13 studies (A Horodynski & Arndt, 2005; Carnell et al., 2011; Duncanson & Burrows, 2013; Freeman & Stevens, 2008; Herman et al., 2012; Hildebrand & Shriver, 2010; Hughes et al., 2010; Kalinowski et al., 2012; Lindsay et al., 2009; Moore et al., 2010; Nielsen et al., 2013; Omar et al., 2010; Peters et al., 2014; Tipton, 2014)

Wider society			
Being part of social networks: Caregivers may be more likely to offer sugary drinks and snacks to infants, when encouraged to do so by other family members, or if other children are consuming them. This may be of greater relevance where the culture of the family views food as an expression of love, or where there is a recent cultural memory of food insecurity.	High	Graded as high confidence because there were only minor methodological limitations and minor concerns about relevance.	12 studies (Carnell et al., 2011; Duncanson & Burrows, 2013; Herman et al., 2012; Horodynski et al., 2009; Hughes et al., 2010; Kalinowski et al., 2012; Lindsay et al., 2009, 2010; Moore et al., 2010; Omar et al., 2010; Pagnini et al., 2007; Peters et al., 2014; Tipton, 2014)
Being part of social networks: Caregivers who have memories of sugary drinks and snacks being restricted when they were children may be more likely to offer sugary drinks and snacks to their infants.	Low	Graded as low confidence because of moderate methodological limitations and substantial concerns about relevance and adequacy.	3 studies (Herman et al., 2012; Kalinowski et al., 2012; Moore et al., 2010)

Responding to the food environment: Caregivers may be more likely to offer infants sugary drinks and snacks in situations where they don't have access to convenient alternatives, such as fruit or water, at a reasonable or no extra cost	Moderate	Graded as moderate confidence because of moderate methodological limitations, some concerns about adequacy and minor concerns about relevance.	8 studies (Carnell et al., 2011; Hildebrand & Shriver, 2010; Horodynski et al., 2009; Lindsay et al., 2009; Omar et al., 2010; Pagnini et al., 2007; Peters et al., 2012; Tipton, 2014)

Additional file 1: Adherence to 'enhancing transparency in reporting the synthesis of qualitative research' (ENTREQ) statement

A4: ENTREQ checklist (1) **and where addressed in the review**

	Item	Guide and description	Where addressed
1	Aim	State the research question the synthesis addresses.	P2 and 3
2	Synthesis methodology	Identify the synthesis methodology or theoretical framework which underpins the synthesis, and describe the rationale for choice of methodology (e.g. meta-ethnography, thematic synthesis, critical interpretive synthesis, grounded theory synthesis, realist synthesis, meta-aggregation, meta-study, framework synthesis).	P4 P7-8
3	Approach to searching	Indicate whether the search was pre-planned (comprehensive search strategies to seek all available studies) or iterative (to seek all available concepts until they theoretical saturation is achieved).	P5
4	Inclusion criteria	Specify the inclusion/exclusion criteria (e.g. in terms of population, language, year limits, type of publication, study type).	P4
5	Data sources	Describe the information sources used (e.g. electronic databases (MEDLINE, EMBASE, CINAHL, psycINFO, Econlit), grey literature databases (digital thesis, policy reports), relevant organizational websites, experts, information specialists, generic web searches (Google Scholar) hand searching, reference lists) and when the searches conducted; provide the rationale for using the data sources.	P5
6	Electronic Search strategy	Describe the literature search (e.g. provide electronic search strategies with population terms, clinical or health topic terms, experiential or social phenomena related terms, filters for qualitative research, and search limits).	Additional file A2
7	Study screening methods	Describe the process of study screening and sifting (e.g. title, abstract and full text review, number of independent reviewers who screened studies).	P5 and Figure 1
8	Study characteristics	Present the characteristics of the included studies (e.g. year of publication, country, population, number of participants, data collection, methodology, analysis, research questions).	Additional table A3
9	Study selection results	Identify the number of studies screened and provide reasons for study exclusion (E,g., for comprehensive searching, provide numbers of studies screened and reasons for exclusion indicated in a figure/flowchart; for iterative searching describe reasons for study exclusion and inclusion based on modifications to the research question and/or contribution to theory development).	Figure 1
10	Rationale for appraisal	Describe the rationale and approach used to appraise the included studies or selected findings (e.g. assessment of conduct (validity and robustness), assessment of reporting (transparency), and assessment of content and utility of the findings).	P8

Additional file 1: Adherence to 'enhancing transparency in reporting the synthesis of qualitative research' (ENTREQ) statement

11	Appraisal items	State the tools, frameworks and criteria used to appraise the studies or selected findings (e.g. Existing tools: CASP, QARI, COREQ, Mays and Pope [25]; reviewer developed tools; describe the domains assessed: research team, study design, data analysis and interpretations, reporting).	P8
12	Appraisal process	Indicate whether the appraisal was conducted independently by more than one reviewer and if consensus was required.	P6
13	Appraisal results	Present results of the quality assessment and indicate which articles, if any, were weighted/excluded based on the assessment and give the rationale.	Additional file: A3
14	Data extraction	Indicate which sections of the primary studies were analyzed and how were the data extracted from the primary studies? (E.g. all text under the headings "results /conclusions" were extracted electronically and entered into a computer software).	P6
15	Software	State the computer software used, if any.	P6
16	Number of reviewers	Identify who was involved in coding and analysis	P6-8
17	Coding	Describe the process for coding of data (e.g. line by line coding to search for concepts).	P6-7
18	Study comparison	Describe how were comparisons made within and across studies (e.g. subsequent studies were coded into pre-existing concepts, and new concepts were created when deemed necessary).	P7
19	Derivation of themes	Explain whether the process of deriving the themes or constructs was inductive or deductive	P7
20	Quotations	Provide quotations from the primary studies to illustrate themes/constructs, and identify whether the quotations were participant quotations of the author's interpretation.	P12-26 Indicated by: "'participant quotation'" or "author's interpretation"
21	Synthesis output	Present rich, compelling and useful results that go beyond a summary of the primary studies (e.g. new interpretation, models of evidence, conceptual models, analytical framework, development of a new theory or construct).	P27 review findings

Additional file 1: Adherence to 'enhancing transparency in reporting the synthesis of qualitative research' (ENTREQ) statement

1. Tong A, Flemming K, McInnes E, Oliver S, Craig J. Enhancing transparency in reporting the synthesis of qualitative research: ENTREQ. BMC Med Res Methodol [Internet]. BMC Medical Research Methodology; 2012 Jan [cited 2014 Sep 15];12(1):181. Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3552766&tool=pmcentrez&rendertype=abstract

Additional file 2: Full search history

Social Policy and Practice database

1 (mother or grandmother or grandfather or father or parent* or carer or care-giver or care giver or legal guardian
or foster*).mp. [mp=abstract, title, publication type, heading word, accession number] (57120)
2 (infant or child or pre-school or pre school or toddler or neonate or newborn).mp. [mp=abstract, title,
publication type, heading word, accession number] (69674)
3 (Food or feeding or food choice or eat* or weaning or complementary feeding or sweets or sugar* or snack* or
drink*).mp. [mp=abstract, title, publication type, heading word, accession number] (7742)
4 (influence or motiv* or aspiration* or challenge* or belief* or aim* or hope* or difficult* or trigger* or
benefit* or choice or choose).mp. [mp=abstract, title, publication type, heading word, accession number] (121009)
5 1 and 12 and 3 and 4 (281)
6 qualitative.mp. or Qualitative Research/ (9239)
7 5 and 6 (16)

Applied Social Sciences Index and Abstracts (ASSIA)

Set#	Searched for	Databases	Results
S2	(mother OR grandmother OR grandfather OR father OR parent* OR carer OR care-giver OR care giver OR legal guardian OR foster*) AND (food OR feeding OR food choice OR eat* OR weaning OR complementary feeding OR sweets OR sugar* OR snack* OR drink*) AND (influence OR motiv* OR aspiration* OR challenge* OR belief OR aim* OR hope* OR difficult* OR trigger OR benefit* OR choice OR choose) AND qualitative AND schol(yes) AND la.exact("ENG")	Applied Social Sciences Index and Abstracts (ASSIA)	184°

Additional file 2: Full search history

PsycINFO

Database: PsycINFO <1806 to October Week 3 2014>
Search Strategy:
---
1 (paren* or mother or father or grandmother or grandfather or grandparent or guardian or foster).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] (282133)
2 (Infant or child or pre-school or toddler or weaning).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] (295536)
3 (food or feeding or infant feeding or weaning or food choice* or complementary feeding or snack* or sugar or drink*).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] (126254)
4 1 and 2 and 3 (5691)
5 (Influenc* or motivation or aspiration* or aim or belief* or hope* or reward* or benefit* or difficult* or trigger*).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] (945333)
6 4 and 5 (2266)

Medline

Database: Ovid MEDLINE(R) <1946 to October Week 5 2014>
Search Strategy:
---
1 (mother or grandmother or grandfather or father or parent* or carer or care-giver or care giver or legal guardian or foster*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier] (449216)
2 (infant or child or pre-school or pre school or toddler or neonate or newborn).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier] (2310580)
3 (Food or feeding or food choice or eat* or weaning or complementary feeding or sweets or sugar* or snack* or drink*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier] (797824)

Additional file 2: Full search history

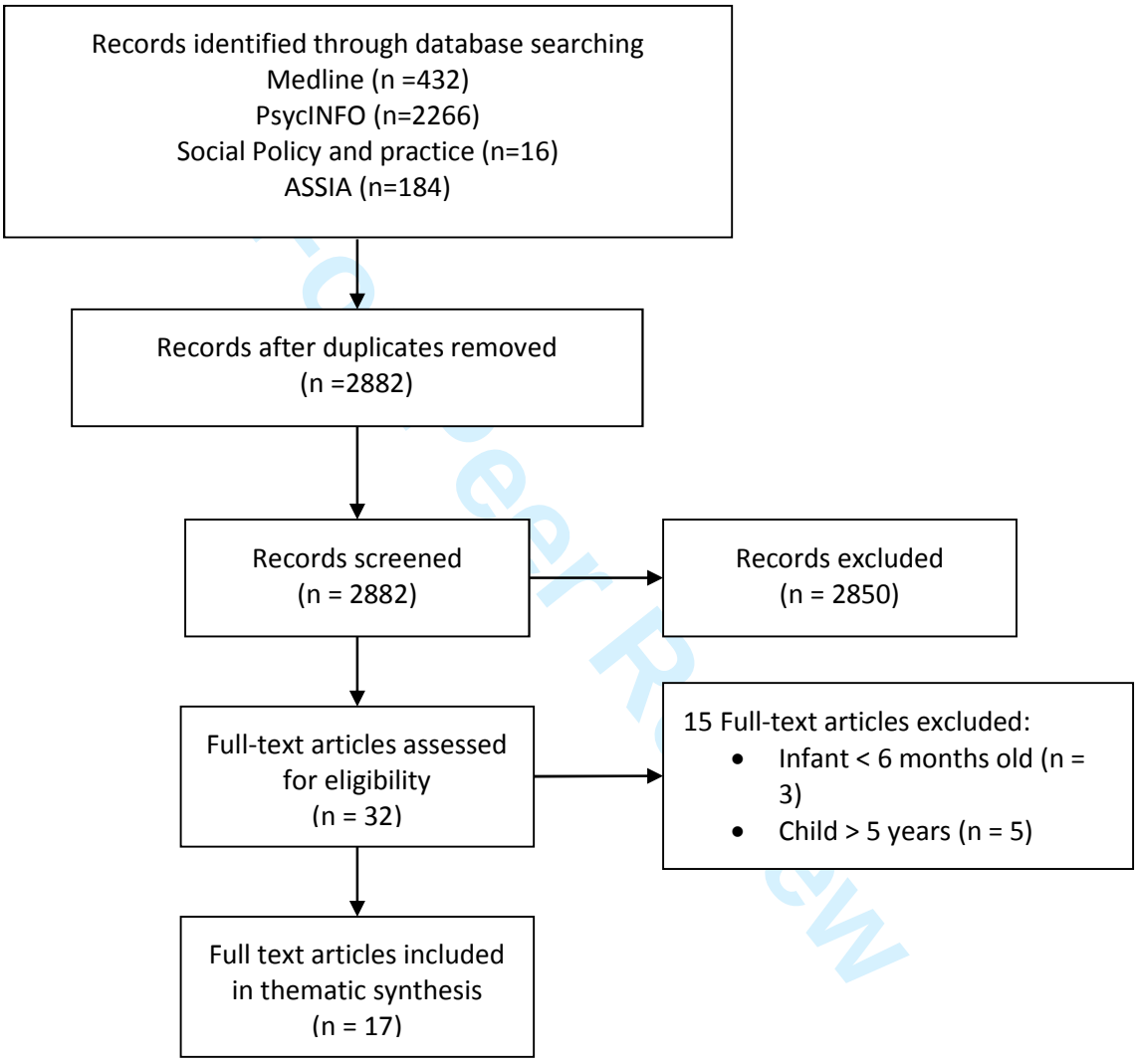
4 (influence or motiv* or aspiration* or challenge* or belief* or aim* or hope* or difficult* or trigger* or benefit* or choice or choose).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier] (3174227)

5 1 and 2 and 3 and 4 (8785)

6 qualitative.mp. or Qualitative Research/ (123770)

7 5 and 6 (432)

Figure 1: Systematic search flow diagram



Additional file 3: Summary table of included studies

Citation	Location	Sample	Data collection and analysis	Main themes / findings related to review question	Methodological quality
(Hughes, Sherman, & Whitaker, 2010)	Kentucky, US	21 mothers of overweight pre-school children (30-60 months). Low SES. 14 White, 7 African American, and all non-Hispanic	Semi-structured interviews. Analysis methods not stated but description sounds like thematic analysis	"(a) Nature vs. nurture, (b) medical authority vs. lived experience, and (c) relieving immediate stress vs. preventing long-term consequences."	High
(Omar, Coleman, & Hoerr, 2010)	3 rural Michigan counties, US	20 caregivers of "toddlers" (11 fathers, 1 boyfriend, 6mothers, 1 grandmother, and 1 aunt). Low SES. 17 were White and 2 Hispanic, 1 African American	3 Focus groups Analysis methods not stated but in the results section refers to 'content analysis'	"Four major themes emerged:(a) Barriers to providing healthy meals, (b) division of responsibility, (c) mealtime behavior, and (d) desired nutrition education. Caregivers identified three barriers to providing healthy meals: (a) scarcity of time, (b) external challenges, and (c) health problems of the child"	High
(Moore, Tapper, & Murphy, 2010)	Cardiff, Wales. UK	12 mothers of children aged 3-5 Med-high SES	Semi-structured interviews "Data were analyzed	"Mothers spontaneously classified their child as a 'good' or a 'bad' eater. Consumption emerged as the dominant feeding	Moderate

[Type text] [Type text] [Type text]

		All were white, 11 being of British origin and 1 from Brazil.	using thematic and interpretative techniques"	goal. For 'bad' eaters, a short-term goal of consuming any food, rather than no food, was adopted. For 'good' eaters, a long-term goal of consuming a varied, well-balanced diet was favoured. Liking as a feeding goal was not mentioned."	
(Tipton, 2014)	New Orleans area, US	18 female, 1 male. Caregivers of a non-Hispanic black child between the ages of 2-5 years. Low SES. Caregiver ethnicity not stated	Small group semi-structured interviews consisting of 2-3 caregivers Elicitation interviews with analysis framework based on Theory of Planned Behaviour	"Behavioral beliefs concerning SSB intake among preschoolers such as the disadvantage of hyperactivity and the benefits of convenience and keeping children content. New insight on normative and control factors that emerged include conflict with grandparents, the perception that preschool staff and other parents of young children would approve of serving SSBs to preschoolers, and the belief that serving SSBs will prevent children from acting out"	High
(Nielsen, Michaelsen, & Holm, 2013)	Copenhagen, Denmark	45 mothers of children aged 7 or 13 months. Medium SES (27 high education, 24	Focus groups Template analysis, inductive and	"The themes are as follows: serving healthy food; integration of the child's food into the food of the family and the wider social environment; management of family relations and everyday	Moderate

Additional file 3: Summary table of included studies

		low education) Ethnicity not stated	deductive	life; and use of public nutritional guidelines.	
(A Horodynski & Arndt, 2005)	Jackson, Mississippi, US.	6 fathers of children aged 3-5 Low SES All African American	One focus group Analysis methods not stated but in the results section refers to 'content analysis'	"Five themes emerged regarding nutrition and mealtime rituals and routines of African-American fathers of toddlers: (a) mealtime rituals and routines, (b) division of responsibility, (c) family constellation, (d) knowledge about healthy eating behaviors, and (e) tension during mealtime."	Low
(Freeman & Stevens, 2008)	Belfast, Northern Ireland, UK	34 mothers of children aged between 3 and 4 years with nursing caries. Low SES Ethnicity not stated but predominantly White area	In depth interviews Grounded theory	"…what emerged was an appreciation of the time concerns, which the mothers experienced when caring for their children together with their attempts at resolution. Time concerns and fears of disturbed mothering and poor parenting provided important insights into why the mothers persisted in prolonged bottle feeding."	Moderate
(Kalinowski et al., 2012)	Midwestern United States	91 mothers of 3-5 year old's Low SES	Semi-structured interviews Constant comparative	"Three themes: 1) negative memories of being fed in childhood 2) Maternal emotional investment in the child enjoying	High

[Type text] [Type text] [Type text]

		32 were Hispanic, 30 African American, and 29 white;	method	the meal 3) Attributing obesity in other people's children to inept or neglectful parenting	
(Hildebrand & Shriver, 2010)	South-central part of US	Qualitative sample only: 18 Female and 4 male caregivers of children aged 2-5 Low SES African American	Focus groups Analyzed using framework based on Transtheoretical Model of Behaviour Change	"In general, parents understood the health benefits provided by fruits and vegetables. Although they believed fresh produce was healthier, they frequently purchased canned or frozen because of the extended shelf-life, convenience, and expense."	Moderate
(Carnell, Cooke, Cheng, Robbins, & Wardle, 2011)	UK	36 mothers of children aged 3-5 Med-high SES Mostly White ethnicity	Telephone interviews (14) and diaries (22) Framework Analysis	"Parents described a wide range of efforts to promote or restrict intake that were largely motivated by practical and health considerations and only rarely by concern about weight. There was also evidence for instrumental feeding, rules surrounding meal-time, child involvement, and parental flexibility in relation to feeding. Almost all parents described responding to children's appetitive traits…"	Moderate
(Lindsay, Sussner, Greaney, &	Boston, US	51 mothers of children aged 2-5	Six focus groups and 20 in-depth interviews	"Respondents related environmental influences to child feeding, diet, and activity,	High

Additional file 3: Summary table of included studies

Peterson, 2009)		Low SES Latina immigrants (Central America and Dominican Republic)	Content analysis organized by domains of the socio-ecological model	namely, supermarket proximity, food cost, access to recreational facilities, neighborhood safety, and weather."	
(Lindsay, Sussner, Greaney, & Peterson, 2010)	As above	As above	As above	"Although subjects understood the health and social consequences related to overweight, many discussed the pressures of familial and cultural influences endorsing a ''chubby child.''	High
(Duncanson & Burrows, 2013)	Rural Australia. Northern New South Wales	21 parents of children aged 2-5 (3 fathers, 18 mothers) Low SES Ethnicity not stated except "higher than state average Aboriginal"	Semi-structured interviews Inductive and deductive analysis. A-priori codes based on Theory of Planned Behaviour	"Behavioral intention to change feeding practices was limited by a belief that child's dietary intake is above average compared with their peer group. Perceived control over child dietary intake was influenced by food advertising, extended family, and peer influences. "	High
(Peters, Parletta, Lynch, & Campbell,	South Australia	21 parents (17 mothers, 3 fathers) of 2-5 year old children	Focus groups Thematic analysis	"Both groups of parents [healthy v's unhealthy] believed it was important to provide healthy diets for their child; however	Moderate

[Type text] [Type text] [Type text]

2014)		Med-high SES Ethnicity not stated		negative and controlling practices reported by the 'unhealthy' group appeared to be less effective and associated with conflict, stress, poorer diet and increased weight and were irrespective of SES	
(Pagnini, Wilkenfeld, King, Booth, & Booth, 2007)	New South Wales, Australia	32 mothers of 2-5 year old children Mixed SES Ethnicity not stated	Focus groups Thematic analysis	"Providing food was an emotional issue for the mothers in this study. They were more concerned about their young children being underweight than overweight, and this increased their stress around children's eating. Food treats were perceived as entitlements. Mothers did believe that they were responsible for their children's eating, but acknowledged the influence of other environmental factors related to food retail and marketing."	Moderate
(Herman, Malhotra, Wright, Fisher, & Whitaker, 2012)	Philadelphia, USA	32 mothers of children 3-5 years Low SES 29 Black, 3 Other,	Focus groups Constant comparative analysis	"Mothers' aspirations were to: 1) prevent hyperactivity and tooth decay by limiting children's sugar intake, 2) use feeding to teach their children life lessons about limit setting and structure, and 3)	Moderate

Additional file 3: Summary table of included studies

		non-White		be responsive to children during mealtimes to guide decisions about portions. Especially around setting limits with sweets and snacks, mothers faced the challenges of: 1) being nagged by children's food requests, 2) being undermined by other adults in the family, and 3) having bad memories from childhood that made it hard to deny children's food requests"	
(Horodynski, Brophy-Herb, Henry, Smith, & Weatherspoon, 2009)	2 different cities, Midwestern US	27 mothers of infants 1-3 years Low SES African American	Focus groups Content analysis	"4 major themes: (1) maternal perceptions of healthy toddlers, (2) maternal food choices for toddlers, (3) maternal expectations about toddler autonomy and self-regulation of feeding, and (4) mealtime context and interaction."	Moderate

Additional file 4: CERQual judgment table

Review finding	Studies contributing to review finding	Methodological limitations	Relevance	Adequacy	Coherence	Overall CERQual confidence in the finding and explanation of judgement
Caregivers may be more likely to offer sweet drinks and snacks in situations where an infant is upset, bored, is seen as deserving a reward or a 'treat'.	(A Horodynski & Arndt, 2005; Carnell et al., 2011; Hughes et al., 2010; Lindsay et al., 2009, 2010; Moore et al., 2010; Omar et al., 2010; Tipton, 2014)	**Minor methodological limitations** 4 studies high quality, 2 moderate and 1 low quality.	**Moderate relevance** Caregivers: All caregivers of children >2 years, 5 studies with mothers, 2 studies included mostly or all fathers. SES: 6 studies with low-income samples, 2 with med-high SES samples. Ethnicity: 4 samples mostly White, 1 African American, 1 ethnicity not-stated, and 1 Latina.	**Moderate adequacy** 7 Studies from the UK and US, with mostly medium to large sample sizes. Moderately rich data from the seven studies overall.	**High coherence** Variation only in the type of behaviour being managed	**Moderate confidence** Minor concerns regarding methodological limitations. High coherence. Moderate (indirect) relevance, with no studies including caregivers of infants younger than 2 years. Moderate adequacy due to sufficient quantity but with limitations in the richness of the data.

Additional file 4: CERQual judgment table

Caregivers may be more likely to offer sweet drinks and snacks to infants during special occasions and celebrations, or if sugary foods are seen as part of the 'food culture' of the family.	(A Horodynski & Arndt, 2005; Carnell et al., 2011; Duncanson & Burrows, 2013; Herman et al., 2012; Horodynski et al., 2009; Kalinowski et al., 2012; Lindsay et al., 2009; Nielsen et al., 2013; Peters et al., 2014)	**Moderate methodological limitations** 9 studies 3 studies of high quality, 5 moderate and 1 low quality	**High relevance** Caregivers: 4 studies with mostly mothers (12 fathers in total) of children over 2 years, 2 with mothers of children under 2 years. SES: 6 Low, 3Med-high Ethnicity: 3 African-American, 2 not stated, 1 mostly White, 1 Aboriginal, 1 Latina, 1 mixed Hispanic, African American and White	**Moderate adequacy** 9 mostly medium to large studies from the US, Aus, UK, and Denmark. Moderately rich data from the 9 studies overall	**High coherence** Consistent view that caregivers frame child feeding in the context of the family 'food culture'. The only exception to this was in the very early phase of complementary feeding (7 months), where at this stage the infants meals were seen as 'a separate category'	**Moderate confidence** Moderate methodological limitations. High coherence. High relevance. Moderate adequacy due to sufficient quantity but with limitations in the richness of the data
Caregivers may be more likely to offer sugary drinks and snacks to infants if they perceive that the infant is unwell, or has a history of being	(Carnell et al., 2011; Duncanson & Burrows, 2013; Lindsay et al., 2010;	**Minor methodological limitations** 3 high and 2 moderate and	**Moderate relevance** Caregivers: 4 studies with mostly mothers of children aged 2-5, 1 study mostly	**Moderate Adequacy** 5 studies with medium to large sample sizes	**High coherence** All studies in agreement that	**Moderate confidence** Minor methodological limitations. High coherence. Moderate (indirect) relevance,

Additional file 4: CERQual judgment table

underweight or low birth weight.	Omar et al., 2010; Pagnini et al., 2007)	quality	fathers SES: 1 mixed, 1 med-high, 3 low Ethnicity: 1 ethnicity not stated, 2 mostly White, 1 Aboriginal, 1 Latina	from the UK, Aus and US Moderately rich data provided by the 5 studies	caregivers are influenced by their perception of the specific health risks of their child	with no studies including caregivers of infants under 2 years and under-representation of fathers. Moderate adequacy due to a sufficient quantity but limitations in the richness of data.
Caregivers may be more likely to offer sugary drinks and snacks if infants are disturbing other members of the family, or are disrupting family routines due to crying, hunger or food refusals. This may be more important in families with higher levels of existing dis-harmony.	(A Horodynski & Arndt, 2005; Carnell et al., 2011; Duncanson & Burrows, 2013; Freeman & Stevens, 2008; Herman et al., 2012; Hughes et al., 2010; Moore et al., 2010; Nielsen et al., 2013; Omar et al., 2010; Peters	**Moderate methodological limitations** 4 High quality, 6 moderate and 1 low quality study	**High Relevance** Caregivers: 8 studies with mostly mothers of children aged 2-5, 2 studies mostly or all fathers, 1 with mothers <2years SES: 4 med-high SES, 6 low SES, Ethnicity: 5 studies mostly White, 2 African American, 3 ethnicity not stated, 1 Aboriginal.	**High Adequacy** 11 mostly medium to large studies from the US, UK, Aus and Denmark. Rich data provided by the 11 studies overall	**High coherence** High coherence with variation in parental resolve between studies explained by more or less harmonious family environments	**High confidence** Moderate methodological limitations. Highly coherent and highly relevant. High adequacy due to a sufficient quantity of rich data.

Additional file 4: CERQual judgment table

	et al., 2014; Tipton, 2014)					
Caregivers may be more likely to offer infants sugary drinks and snacks when they are busy, tired, rushed, or struggling to cope with negative emotions. This may become more important if caregivers are coping with negative emotions and difficult life circumstances in general.	(A Horodynski & Arndt, 2005; Carnell et al., 2011; Duncanson & Burrows, 2013; Freeman & Stevens, 2008; Herman et al., 2012; Hildebrand & Shriver, 2010; Hughes et al., 2010; Kalinowski et al., 2012; Lindsay et al., 2009; Moore et al., 2010; Nielsen et al., 2013; Omar et al., 2010;	**Minor methodological limitations** 5 High quality and 8 Moderate quality	**High Relevance** Caregivers: 10 with mothers of children aged >2, 2 with mothers of infants <2, 1 study with mostly fathers SES: 3 med-high, 10 low Ethnicity: 5 mostly White, 3 not stated, 2 mostly African-American, 1 Latina, 1 Aboriginal, 1 mixed Hispanic, African American and White	**High Adequacy** 13 medium to large studies studies from the UK, US, AUS, and Denmark. Rich data provided by the 13 studies overall	**High Coherence** High coherence between and within studies	**High Confidence** Minor concerns regarding methodological limitations. High coherence. High relevance, albeit with under representation of fathers. High adequacy due to a sufficient quantity and rich data

Additional file 4: CERQual judgment table

	Peters et al., 2014; Tipton, 2014)					
Caregivers may be more likely to offer sugary drinks and snacks to infants, when encouraged to do so by other family members, or if other children are consuming them. This may be of greater relevance where the culture of the family views food as an expression of love, or where there is a recent cultural memory of food insecurity.	(Carnell et al., 2011; Duncanson & Burrows, 2013; Herman et al., 2012; Horodynski et al., 2009; Hughes et al., 2010; Kalinowski et al., 2012; Lindsay et al., 2009, 2010; Moore et al., 2010; Omar et al., 2010; Pagnini et al., 2007; Peters et al., 2014; Tipton, 2014)	**Minor methodological limitations** 6 high quality, 6 moderate quality	**Moderate Relevance** Caregivers: 10 studies with mostly mothers of children > 2 years, 1 with mothers of infants < 2 years, 1 study with mostly fathers SES: 3 med-high, 8 low, 1 mixed SES Ethnicity: 4 mostly White, 1 Aboriginal, 2 African-American, 1 Latina, 4 ethnicity not stated, 1 mixed Hispanic, African-American and White	**High Adequacy** 12 medium to large studies from the UK, US and Aus. Rich data provided by the 12 studies	**High coherence** High coherence across studies that caregivers are influenced in food choices for their infants by other family members and peers	**High confidence** Minor concerns regarding methodological limitations. High coherence. Moderate relevance, with under representation of fathers and caregivers of infants younger than 2 years. High adequacy due to a sufficient quantity and rich data
Caregivers who have memories of sugary drinks and snacks being restricted when they	(Herman et al., 2012; Kalinowski et	**Moderate methodological limitations**	**Moderate Relevance** Caregivers: 3 studies	**Low Adequacy** 2 medium and 1 very large	**High Coherence** Coherent	**Low confidence** Moderate concerns regarding

Additional file 4: CERQual judgment table

were children may be more likely to offer sugary drinks and snacks to their infants	al., 2012; Moore et al., 2010)	2 moderate and 1 high quality	with mothers of children aged 3-5 SES: 1 med-high, 2 low Ethnicity: 1 White, 1 Black, 1 mixed Hispanic, African-American and White	samples form the UK and US Moderately rich data overall	across the 3 studies that caregivers wish to improve upon their own child feeding experiences	methodological limitations, moderate (indirect and partial) relevance, with no caregivers of infants younger than two, or any fathers included. Low adequacy due to only a small number of studies with some limitations in the richness of the data
Food environments: Caregivers may be more likely to offer infants sugary drinks and snacks in situations where they don't have access to convenient alternatives, such as fruit or water, at a reasonable or no extra cost	(Carnell et al., 2011; Hildebrand & Shriver, 2010; Horodynski et al., 2009; Lindsay et al., 2009; Omar et al., 2010; Pagnini et al., 2007; Peters et al., 2012; Tipton, 2014)	**Moderate methodological limitations** 3 high and 5 moderate quality	**Moderate Relevance** Caregivers: 6 with mothers of children aged 2-5, 1 with mothers 1-3 years, 1 mostly fathers SES: 2 med-high, 5 low, 1 mixed Ethnicity: 2 mostly White, 2 African-American, 2 not stated, 1 Aboriginal, 1 Latina	**Moderate Adequacy** 8 medium to large studies from the US, UK and Aus. A mixture of moderately rich and fairly thin data	**High Coherence** Agreement between and within studies	Moderate concerns regarding methodological limitations. High coherence. Moderate relevance due to under-representation of caregivers of infants under 2 years and fathers. Moderate adequacy due to sufficient quantity but some limitations in the richness of the data

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